

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

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(PCT Article 36 and Rule 70)

Applicant's or agent's file reference BP107835	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/FI 2003/000812	International filing date (day/month/year) 3.11.2003	Priority date (day/month/year) 4.11.2002
International Patent Classification (IPC) or national classification and IPC A23L 1/10		
Applicant Suomen Viljava Oy et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

- a. ☒ (sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:
- ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
- ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

- b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- ☒ Box No. I Basis of the report
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand 25.05.2004	Date of completion of this report 26.01.2005
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88 Form PCT/IPEA/409 (cover sheet) (January 2004)	Authorized officer Susanna Lindfors/Els Telephone No. +46 8 782 25 00

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2003/000812

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1 - 17 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* 19 - 20 received by this Authority on 2004-10-14
- pages* _____ received by this Authority on _____
- ☐ the drawings:
- pages _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to the sequence listing (specify): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to the sequence listing (specify): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2003/000812

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1 - 18</u>	YES
	Claims	_____	NO
Inventive step (IS)	Claims	<u>1 - 18</u>	YES
	Claims	_____	NO
Industrial applicability (IA)	Claims	<u>1 - 18</u>	YES
	Claims	_____	NO

2. Citations and explanations (Rule 70.7)

The invention relates to a method for preparing a starch-containing oat product in particle form. The object of the invention is to provide a solution to the problems in treating flour containing avenaceous starch, regarding mass transfer, pulverization and silting and to decrease the tendency of a material containing oat starch to become rancid because of fat oxidation. The method according to the invention involves treating a material containing avenaceous starch so as to damage the starch granules and to partially release their amylase and amylopectin so that lipids are bound to them. The plastic mass obtained by the treatment is dried and the dried mass is broken up in particles.

Reference is made to the following documents:

D1: Starch/Stärke, Volume 53, 2001, Antje Becker et al: "Relevance of Amylose-lipid Complexes to the Behavior of Thermally Processed Starches"

D2: US 20010026828 A

D3: Can. J. Physiol. Pharmacol, volume 69, 1991, Costas G. Billaderis: "The structure and interactions of starch with food constituents", pages 60 - 78, see especially pages 67 - 68

D4: Carbohydrate Polymers, volume 43, 2000, F. Tufvesson et al: "Formation and crystallization of amylase- monoglyceride complex in a starch matrix", pages 359 - 365

The documents D1 and D2 are considered to represent the closest prior art.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: BOX V

D1 discloses a study wherein the properties of starch/water mixtures that have been heated without shearing have been studied. In the study, samples were prepared by adding water to a starch-containing material; the mixtures were heated at 140 °C, freeze-dried and milled with a screen of 1 mm pore diameter. The study showed that amylase-lipid complexes are formed in normal cereal starches after thermal conversion.

D2 describes a process for manufacture of a thickening/binding agent. The process involves extrusion of a starch-containing material, to which water has been added, drying and grinding of the extrudate to obtain a product particle size of between about 0,1 and 3 mm. The thickening agent produced by the process shows an improved solubility and problems with "post-thickening", i.e. the viscosity of the mixture obtained by dispersion thickens over time when the product is not kept at a high and constant temperature, are avoided.

The method according to amended claim 1 differs from D1 or D2 in that it relates to a starch-containing oat product and in that the temperature of the material during the treatment does not exceed about 105 °C.

The problems to be solved by the invention, regarding mass transfer and the tendency of the material to become rancid, are specifically related to oat starch since oat starch has a small granule size as well as an exceptionally high fat content. Neither D1 nor D2 relates to the difficulties of handling a small granule size material or to the problem of oxidation of the fat contained in the starch. There is no indication in any of the cited documents that would lead a person skilled in the art to the claimed method for manufacturing a starch-containing product or to the claimed starch-containing oat product.

Consequently, the method according to amended claims 1 - 12 and 17, the starch-containing product according to amended claims 13 - 16 and the use according to amended claim 18 are novel and considered to involve an inventive step. The invention fulfils the requirement of industrial applicability.

Claims

1. A method for manufacturing a starch-containing oat product in particle form, **characterized** in that a material containing avenaceous starch granules and fat from oat grains is moistened, the material is treated so as to damage the starch granules and to partially release their amylose and amylopectin so that fat is bound to them, the temperature of the material during the treatment being not more than about 105 °C, the plastic mass obtained by the treatment, wherein the damaged starch acts as a binder, is dried and the dried mass is broken up in particles.
2. A method according to Claim 1, **characterized** in that the material to be moistened, which forms the starting material, is powdery.
3. A method according to Claim 1 or 2, **characterized** in that the material is moistened to a moisture content of about 21 – 26%.
4. A method according to any of the preceding claims, **characterized** in that the starch is damaged by means of leading the moistened material through an extruder or an expander.
5. A method according to any of the preceding claims, **characterized** in that the amount of energy used for damaging the starch is 22 – 30 kWh/1000 kg of material.
6. A method according to any of the preceding claims, **characterized** in that in connection with moistening, the material is heated so that partial damage to the starch is caused.
7. A method according to any of the preceding claims, **characterized** in that the material is treated so that the degree of damage to the starch granules is about 30 – 60%.
8. A method according to any of the preceding claims, **characterized** in that the dried mass is disintegrated by means of grinding so as to form granules.
9. A method according to any of the preceding claims, **characterized** in that the particle size of the end product is larger than that of the starting material that is moistened.
10. A method according to any of the preceding claims, **characterized** in that the starting material that is to be moistened is oat meal having a starch content of at least about 50%, preferably about 70 – 90%, and the fat content about 5 – 8%

11. A method according to any of Claims 1-9, **characterized** in that the moistened starting material is constituted by starch granules, which contain starch and fat and have been separated from the other ingredients of the oat grains.
12. A method according to any of Claims 1-9, **characterized** in that the moistened starting material contains avenaceous starch or oat meal combined with a carrier in particle form.
13. A starch-containing oat product in particle form, which can be manufactured by a method according to any of the preceding claims, **characterized** in containing damaged avenaceous starch, wherein the amylose and amylopectin of the starch granules are partially released, while the starch acts as a binder that keeps the particles together, and fat from oat grains, which in the product are essentially fully bound into complexes.
14. A product according to Claim 13, **characterized** in that the starch content of the product is at least 50% and the fat content about 5-8 %.
15. A product according to Claim 13 or 14, **characterized** in that the degree of damage to the starch granules is 30 – 60%.
16. A product according to any of Claims 13 to 15, **characterized** in that there are undamaged starch granules left in the product.
17. A method according to any of Claims 13 to 16, **characterized** in that the product is constituted by grains, the sizes of which are mainly in the range of 0.25 – 2.0 mm.
18. The use of a product manufactured according to any of Claims 1 to 12 or that of a product in particle form according to any of Claims 13 to 17 in foodstuffs, such as bakery products.